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Chronic monarticular synovitis

Diagnostic and prognostic features

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Fletcher, M. R., and Scott, J. T. (1975). *Annals of the Rheumatic Diseases*, **34**, 171. **Chronic monarticular synovitis. Diagnostic and prognostic features.** Data have been analysed from a retrospective review of 151 patients with monarthritis of more than 3 months' duration, usually involving the knee joint. The largest group, 49 patients (32%), had synovitis of unknown cause, 44 (29%) had synovitis probably associated with osteoarthrosis, and 13 (9%) were diagnosable at presentation as having rheumatoid arthritis according to American Rheumatism Association (1959) criteria, which include serological and histological findings. There was only one case of tuberculous synovitis.

Twelve of the thirteen patients diagnosed as rheumatoid arthritis developed involvement in other joints. In most other conditions, however, including synovitis of unknown cause, the prognosis was favourable, with either improvement or complete remission.

Synovitis of a single joint, often the knee, presents a frequent problem in rheumatology clinics. Treatable conditions must be identified and dealt with, but often it is not possible to make a precise diagnosis at the time and the question of prognosis then arises; in particular, is the monarthritis a presenting feature of polyarticular rheumatoid arthritis, which, as is well recognized, can start in a single joint? The present study is a retrospective review of the diagnostic and prognostic experience of peripheral monarthritis seen in a single clinic.

Plan of study

New cases of monarthritis attending the Rheumatology Unit of the Charing Cross Group of Hospitals (mainly at the West London Hospital) were recorded in a diagnostic card-index system, and clinical, radiological, and laboratory data were collected on such patients who had been seen in the 7-year period between June 1966 and May 1973. The study was confined to monarticular arthritis of 3 months' duration or more, the criteria for the presence of synovitis being pain or tenderness and swelling of a single peripheral joint. Involvement of the vertebrae, hips, and shoulders was excluded because of difficulty in identifying with certainty, especially in a retrospective survey, the presence of synovitis in central joints. Where necessary patients were recalled for a special follow-up examination to determine the eventual outcome of their condition.

Patients were grouped into probable diagnostic categories, using the criteria shown in Table I. Most cases were categorized easily enough, although difficulty sometimes arose in deciding whether synovitis was associated with coexistent osteoarthrosis. In a few patients trauma to a single joint had developed to rheumatoid or psoriatic arthritis with predominant involvement of that joint (Williams and Scott, 1967). Some of the A.R.A. criteria for rheumatoid arthritis (numbers 4 and 5) referring to involvement of more than one joint were not applicable in patients with monarthritis, and diagnosis rested more on radiological, serological, and histological findings.

Results

DIAGNOSIS

151 patients (100 female, 51 male) presented with monarthritis of a peripheral joint in the 7-year period. Mean age was 47 years (range 12 to 88 years). Diagnostic analysis is shown in Table II, from which it is seen that the largest group was 'synovitis of unknown cause', accounting for nearly one-third of the cases, followed by synovitis associated with osteoarthrosis and the group of miscellaneous conditions, a detailed list of which is given in Table III.

FACTORS OF DIAGNOSTIC VALUE

(a) Clinical features

Sex and age were of little significance. A history of joint locking, followed by swelling, was typical of an intra-articular loose body and a story of trauma was obviously relevant, although this was sometimes obtained in synovitis with rheumatoid arthritis or osteoarthrosis. The distribution of joint involvement is shown in Table IV; of the ten patients with monarthritis of the wrist, six had rheumatoid arthritis and four chondrocalcinosis.

Extra-articular features such as the skin lesion of psoriasis, the signs of tabes dorsalis, urethritis, and anterior uveitis were naturally critical.

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Table I *Diagnostic criteria*

Rheumatoid arthritis	American Rheumatism Association (1959) criteria of classical or definite rheumatoid arthritis
Synovitis secondary to osteoarthrosis	Synovitis with radiological signs of moderate or severe degenerative joint disease (Kellgren and Lawrence, 1957)
Chondrocalcinosis	Typical radiological signs of chondrocalcinosis and/or calcium pyrophosphate crystals seen on polarizing microscopy of the synovial fluid
Traumatic synovitis	Synovitis clearly related to a history of injury to that joint
Loose intra-articular body	Loose body radiologically plus a history of synovitis preceded by joint locking
Osteochondritis dissecans	Synovitis associated with the typical radiological appearance of this condition
Miscellaneous	A group of other conditions causing synovitis, e.g. psoriatic arthritis, defined by the usual clinical criteria
Unknown	Inflammatory synovitis of unknown cause, not falling into any of the above diagnostic categories

Table II *Diagnostic analysis*

	No.	*%*
Rheumatoid arthritis	13	9
Osteoarthrosis	44	29
Chondrocalcinosis	6	4
Traumatic synovitis	8	5
Loose body	5	4
Osteochondritis dissecans	8	5
Miscellaneous	18	12
Synovitis of unknown cause	49	32
Total	151	100

Table III *Miscellaneous diagnoses*

Psoriatic arthropathy (3)
Septic arthritis
Reiter's syndrome (2)
Ankylosing spondylitis
Crohn's disease
Sarcoidosis
Freiberg's disease
Neuropathic arthropathy (2)
Associated with focal glomerulonephritis
Giant cell synovitis
Malignant synovioma
Epiphyseal osteoblastoma
Tuberculosis
'Hypermobility syndrome'

Table IV *Joint distribution of monarthritis*

Elbow	4
Wrist	10
Metacarpophalangeal	1
Knee	112
Ankle	12
Metatarsophalangeal	2
Interphalangeal (fingers and toes)	10
Total	151

(*b*) *Laboratory investigation*

The sheep-cell agglutination test is one of the A.R.A. diagnostic criteria for rheumatoid arthritis and assumes particular importance in monarthritis where those criteria which are dependent on multiple joint involvement are necessarily negative. In fact the test was positive to a titre of 1:32 or over in the thirteen patients diagnosed as rheumatoid arthritis (whose subsequent history, as discussed below, tended to justify the diagnosis) and was negative or equivocal in all other cases.

The erythrocyte sedimentation rate (ESR) usually lay between 10 mm/h and 35 mm/h and readings in this range were of little diagnostic value. Readings above and below these figures appeared to have some value in exclusion, in that an ESR of less than 10 mm/h was not found in cases of rheumatoid arthritis and chondrocalcinosis, and an ESR of more than 35 mm/h was not present in cases of osteoarthrosis, trauma, and osteochondritis dissecans. Microscopy and culture of synovial fluid were often critical in the diagnosis of chondrocalcinosis and infective arthritis; synovial fluid protein concentration tended to be higher in rheumatoid arthritis (mean 54 g/l, range 48 to 63 g/l) than in other conditions (mean 40 g/l, range 26 to 70 g/l) but the difference was not significant. Cytological examination, as far as it had been adequately carried out, was of no particular diagnostic value.

(*c*) *Radiology*

Radiological appearances constituted diagnostic criteria in synovitis secondary to osteoarthrosis, loose bodies, chondrocalcinosis, and osteochondritis dissecans. In the patients with monarticular rheumatoid disease radiography at the time of presentation was not helpful. Para-articular osteoporosis was present (and this is one of the A.R.A. criteria for rheumatoid arthritis), but from the clinical point of

view this is a nonspecific appearance and is of no help in distinguishing rheumatoid arthritis from other causes of inflammatory monarthritis. Erosive changes developed later in the 13 cases of rheumatoid arthritis, although not always in the original joint involved.

(*d*) *Synovial histology*

Synovial biopsy was usually done in the period under review by blind needle technique, although a few specimens were obtained at operation. It was carried out in 53 patients, twelve of whom were diagnosed as rheumatoid arthritis, two synovitis secondary to osteoarthrosis, eight miscellaneous diagnoses, and 23 synovitis of unknown cause; in eight cases the synovium obtained was inadequate for proper histological examination.

The diagnosis in the two patients with tuberculosis and malignant synovioma was made by biopsy.

To satisfy the A.R.A. criteria for rheumatoid arthritis synovial histology should show 'characteristic histological changes in synovial membrane with three or more of the following: marked villous hypertrophy; proliferation of superficial synovial cells often with palisading; marked infiltration of chronic inflammatory cells (lymphocytes or plasma cells predominating) with tendency to form "lymphoid nodules"; deposition of compact fibrin, either on surface or interstitially; foci of cell necrosis'. These

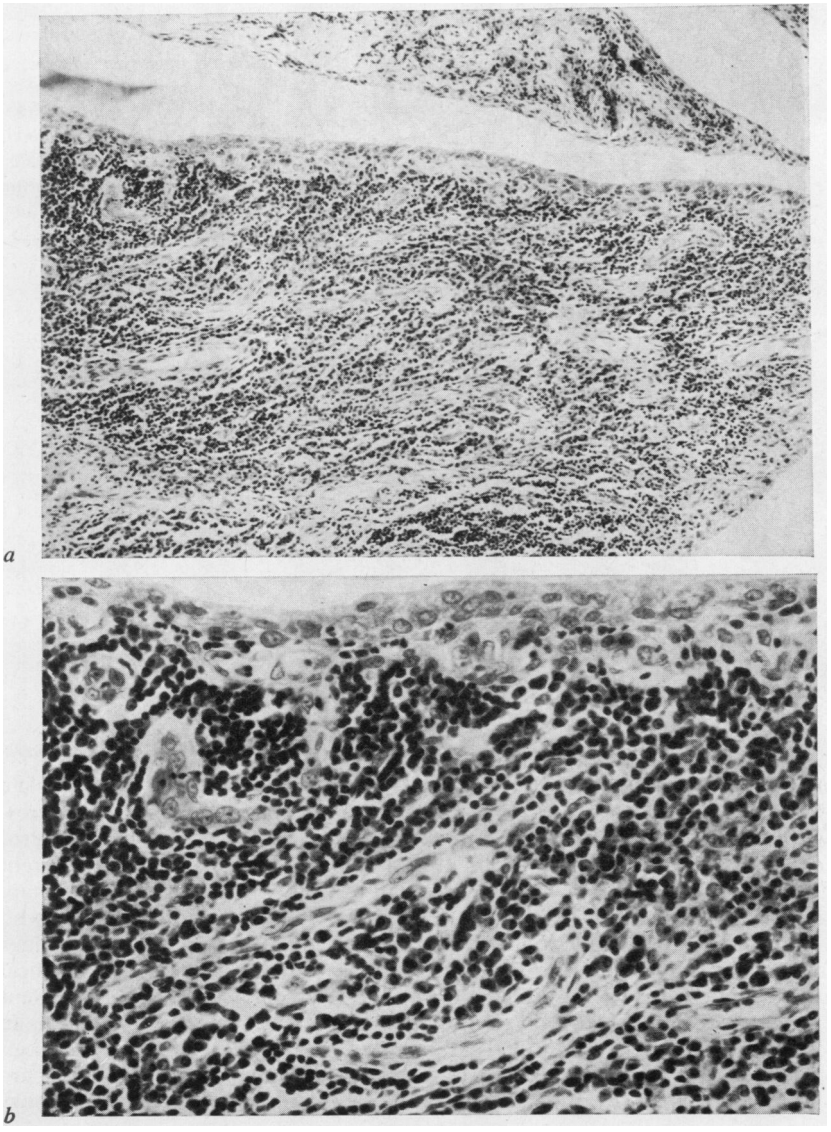

FIG. 1 *Needle biopsy of knee from patient diagnosed as rheumatoid arthritis, showing villous hypertrophy, proliferation of superficial synovial cells, and marked infiltration with chronic inflammatory cells (lymphocytes and plasma cells).* (*a*) ×96; (*b*) ×240

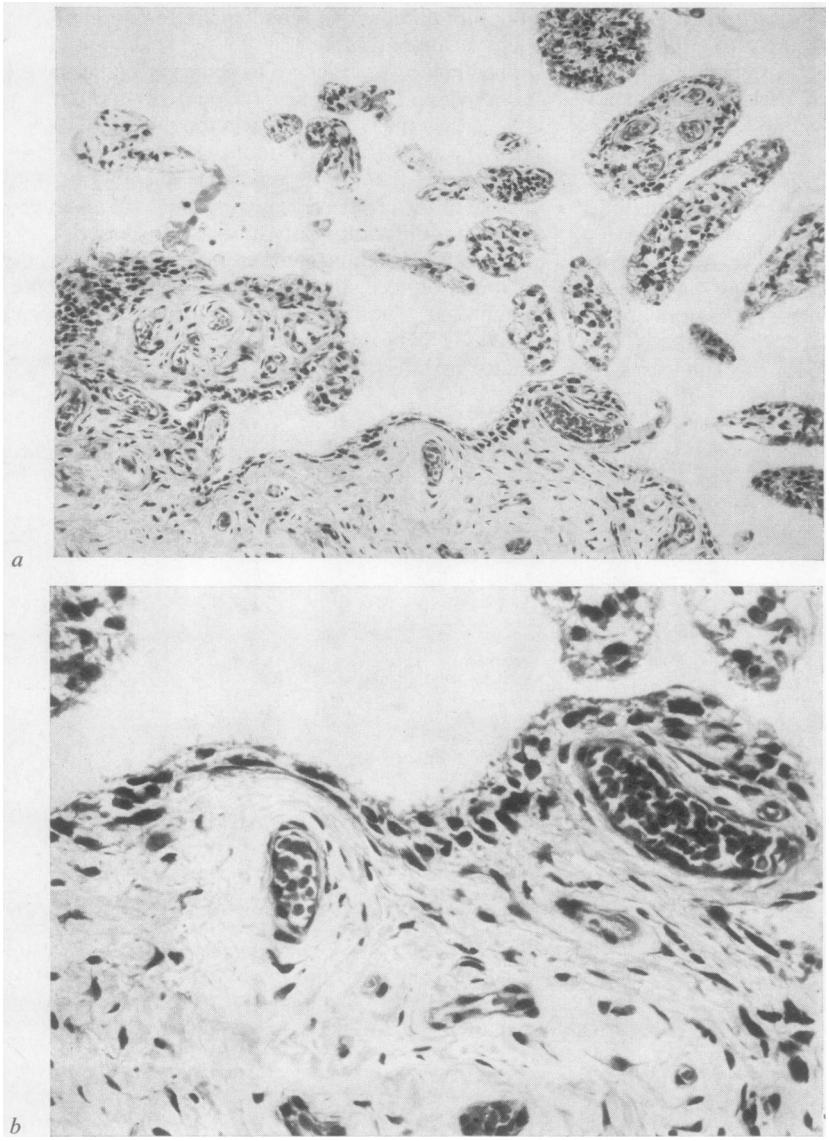

FIG. 2 *Needle biopsy of knee from patient diagnosed as 'synovitis of unknown cause', showing villous hypertrophy and proliferation of superficial synovial cells, but less marked infiltration with chronic inflammatory cells.* (*a*) ×96; (*b*) ×240

features were considered positive in the twelve patients diagnosed as monarticular rheumatoid disease, an example being shown in Fig. 1. In contrast, the patients designated 'synovitis of unknown aetiology' showed such changes to a minor degree only, with much less follicular aggregation of chronic inflammatory cells, perivascular infiltration, and cellular proliferation; although showing synovial cell hyperplasia, subsynovial vascular congestion, and oedema (Fig. 2). Thus, although the differences were to some extent quantitative, it was usually possible to assign a particular specimen to one or other category, i.e. rheumatoid or nonrheumatoid, without too much difficulty.

PROGNOSIS

Prognosis in all patients was coded. (1) Complete remission. (2) Improved. (3) Unchanged. (4) Progression to involvement of two or three joints. (5) Progression to polyarthritis. Prognosis in the different diagnostic groups, together with length of follow-up, is shown in Fig. 3. Twelve of the thirteen patients who on clinical, serological, and histological findings satisfied the A.R.A. criteria of definite or classical rheumatoid arthritis at the time of presentation, went on to develop arthritis in other joints. Prognosis in other patients with monarthritis was good or excellent apart from rare malignant conditions. In particular, patients falling into the diagnostic category

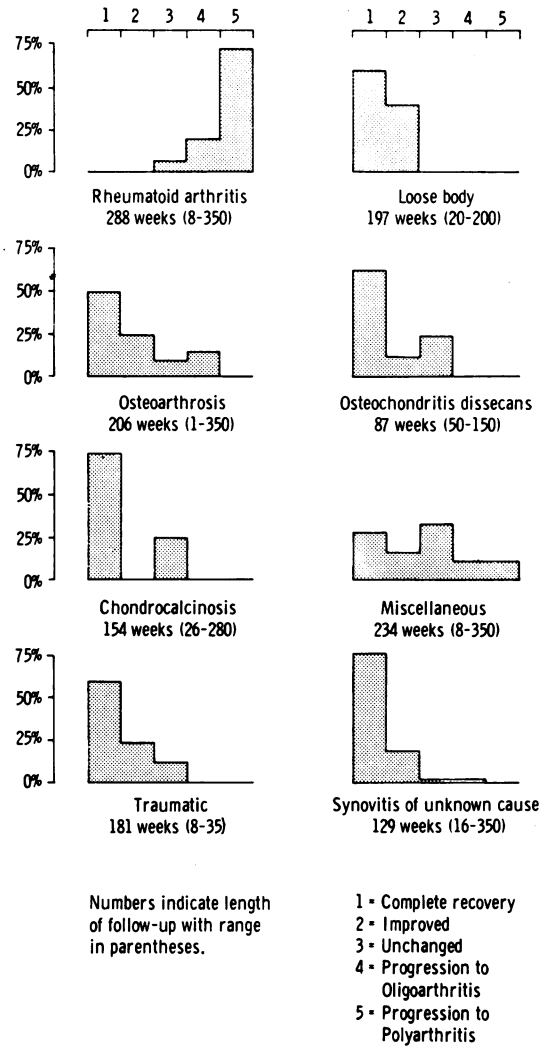

FIG. 3 *Prognostic categories for the 8 diagnostic groups of monarthritis. 1. Complete remission. 2. Improved. 3. Unchanged. 4. Progression to 2 or 3 joints. 5. Progression to polyarthritis. Ordinates represent percentage of cases in each group. Under each diagnosis are indicated the means and ranges of follow-up periods*

of synovitis of unknown cause did well, nearly all showing complete remission or improvement and none developing polyarticular rheumatoid disease (although one patient did develop synovitis in two other joints). Similar satisfactory progress was observed in patients with synovitis secondary to osteoarthrosis and traumatic synovitis. The outlook in chondrocalcinosis was excellent and that in osteochondritis dissecans usually good (sometimes with surgical débridement).

Thus, the only factor of prognostic significance in monarticular arthritis was the diagnosis itself; most patients in whom a diagnosis of monarticular rheumatoid disease could be established (according to the criteria described) went on to develop disease in other joints, whereas nearly all other patients did well.

Discussion

Disease duration of 3 months or more was stipulated because it is in these relatively long-term cases that anxiety arises about prognosis and the possible development of polyarticular rheumatoid disease. Monarthritis of shorter duration was excluded, resulting in the omission from this study of patients with gout and most patients with chondrocalcinosis, traumatic synovitis, and infective arthritis.

A retrospective study such as this must have certain limitations. Clinical documentation tends to be incomplete, diagnostic classification difficult and uncertain. Moreover, conclusions are influenced by factors of patient selection—all the subjects were referred to a rheumatology clinic and experience there is probably very different from that encountered in general practice, or in orthopaedic or casualty departments where, for example, various types of traumatic lesion might well be more common than the 8 cases of traumatic synovitis seen in the present series. It is noteworthy that meniscal lesions of the knee were not encountered as far as can be ascertained.

Nevertheless, certain valid and useful points emerge. In the first place the changing pattern of monarthritis during the past half-century is confirmed. Tuberculous synovitis, formerly pre-eminent in children and in adults (Green, 1940) is now a rarity in this country, and traumatic synovitis and rheumatoid disease is therefore relatively more common. The proportion of cases of chronic monarthritis which are diagnosable as rheumatoid arthritis varies in different series no doubt partly owing to different diagnostic criteria, e.g. 6% (Rasmussen, Reimann, and Andersen, 1973), 22% (Pollard, Mayne, and Soule, 1962), and 27% (Pitkeathly, Griffiths, and Catto, 1964). The incidence in the present survey is 13 cases out of 151 (9%). The commonest type of adult monarthritis, however, appears to be a nonspecific synovitis of indeterminate cause or causes comprising 49 cases (32%). This condition was recognized and regarded as an entity in children by Hellström (1961). Differentiation from synovitis associated with osteoarthrosis, especially if mild, may be impossible and the part played by other factors, such as trauma or possible virus infection, difficult to determine—sedimentation rate is usually low or only moderately raised, rheumatoid serology negative, and histology shows a mild nonspecific synovitis.

Secondly, it appears that full examination and investigation will usually give a good idea of prognosis at an early stage. A diagnosis of monarticular rheumatoid arthritis, indicated especially by a positive sheep-

cell agglutination test and typical synovial histology, signifies probable progression to other joints and erosive polyarthritis. The close relationship between histology and clinical course is perhaps a little surprising in view of the known variation of histological appearance which can be seen in different biopsy specimens from the same joint, a point emphasized by Bywaters and Ansell (1965) in their study of monarticular arthritis in children. Pitkeathly and others (1964), however, also found a moderately good relationship between biopsy findings suggestive of rheumatoid disease and the eventual clinical outcome. Prognosis in other conditions—apart from rarities such as malignancy—is favourable, and the nonspecific synovitis of unknown cause does not in our experience progress to recognizable rheumatoid disease, although others (Villiaumey, Strauss, Di Menza, Larget-Piet, and Rotterdam, 1973) consider the situation to be less predictable.

In only 53 of the cases had synovial biopsy been attempted, a low figure in view of the obvious advisability of obtaining histological material in patients with monarthritis. In some subjects, however, the diagnosis had been reached by other methods, or it is possible that the synovitis may sometimes have appeared so mild to the clinician that biopsy was not undertaken. However, it appears that no case of rheumatoid arthritis or other serious condition was missed because of failure to carry out a biopsy.

It is evident that much remains to be learnt about the problem of monarthritis. The techniques of blind needle biopsy and conventional light microscopy, although invaluable, are now being superseded by arthroscopy, and by fluorescent and electron microscopy, which, it is hoped, will shed further light on the matter.

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References

AMERICAN RHEUMATISM ASSOCIATION (1959) *Ann. rheum. Dis.*, **18**, 49 (Diagnostic criteria for rheumatoid arthritis, 1958 revision)

BYWATERS, E. G. L., AND ANSELL, B. M. (1965) *Ibid.*, **24**, 116 (Monoarticular arthritis in children)

GREEN, W. T. (1940) *J. Amer. med. Ass.*, **115**, 2023 (Mono-articular and pauciarticular arthritis in children)

HELLSTRÖM, B. (1961) *Acta paediat.*, **50**, 529 (The diagnosis and course of rheumatoid arthritis and benign asceptic arthritis in children)

KELLGREN, J. H., AND LAWRENCE, J. S. (1957) *Ann. rheum. Dis.*, **16**, 494 (Radiological assessment of osteo-arthrosis)

PITKEATHLY, D. A., GRIFFITHS, H. E. D., AND CATTO, M. (1964) *J. Bone Jt Surg.*, **46B**, 685 (Monarthritis: a study of forty-five cases)

POLLARD, J. W., MAYNE, J. G., AND SOULE, E. H. (1962) *Arthr. and Rheum.*, **5**, 315 (Chronic monarticular arthritis in adults)

RASMUSSEN, G., REIMANN, I., AND ANDERSEN, R. B. (1973) *Scand. J. Rheum.*, **2**, 65 (Monoarthritis, clinical and histological examination)

VILLIAUMEY, J., STRAUSS, J., DI MENZA, C., LARGET-PIET, B., AND ROTTERDAM, M. (1973) *Rev. Rheum.*, **40**, 627 (Rheumatoid monarthritis)

WILLIAMS, K. A., AND SCOTT, J. T. (1967) *Ann. rheum. Dis.*, **26**, 532 (Influence of trauma on the development of chronic inflammatory polyarthritis)